



Coastal Protection and  
Restoration Authority of Louisiana

# WATER RESOURCES COMMISSION FALL 2013 WORKSHOP

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CPRA

October 17, 2013



committed to our coast

# We Know...

Current

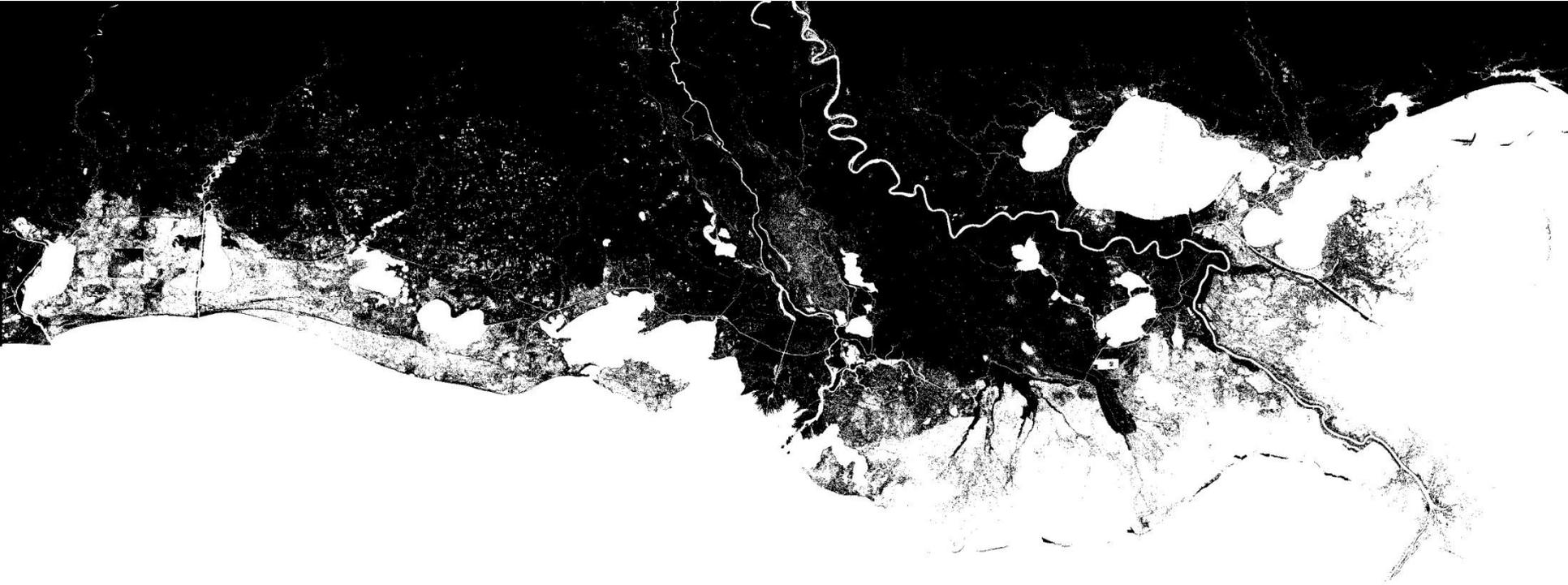
2020

2030

2040

2050

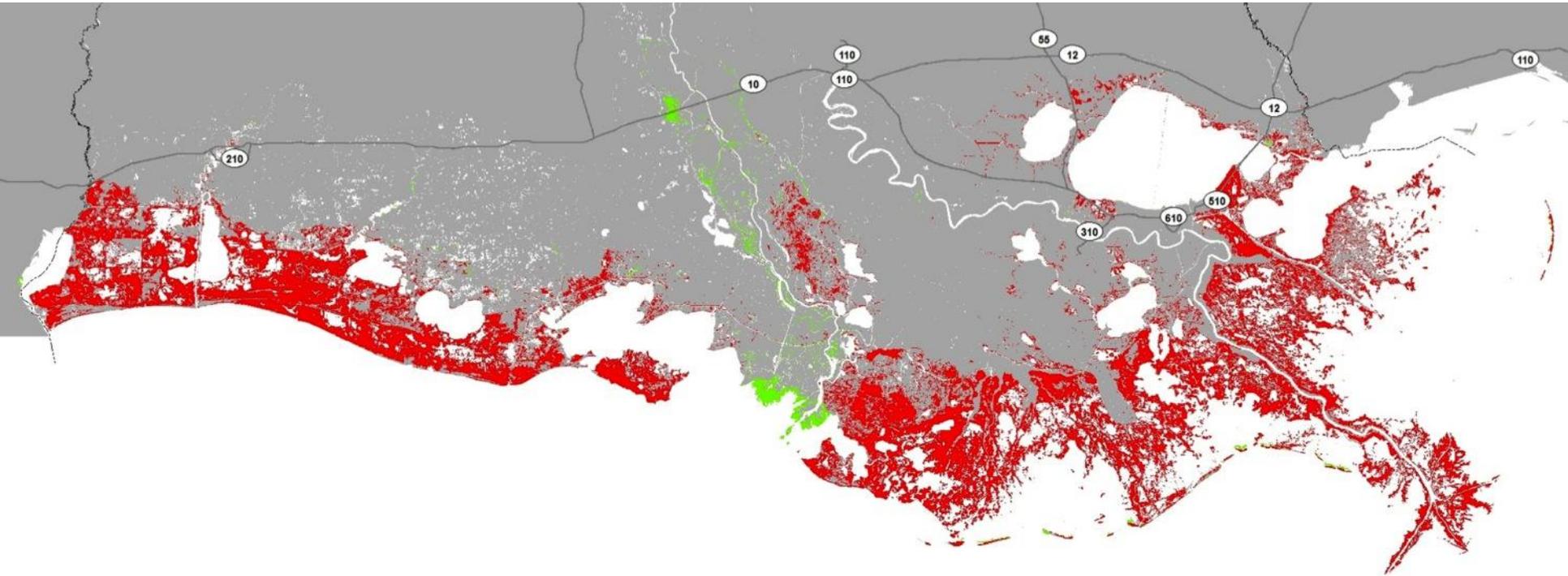
2060



**Our Coastal Crisis with Continue  
Over the Next 50 Years Unless We Act**

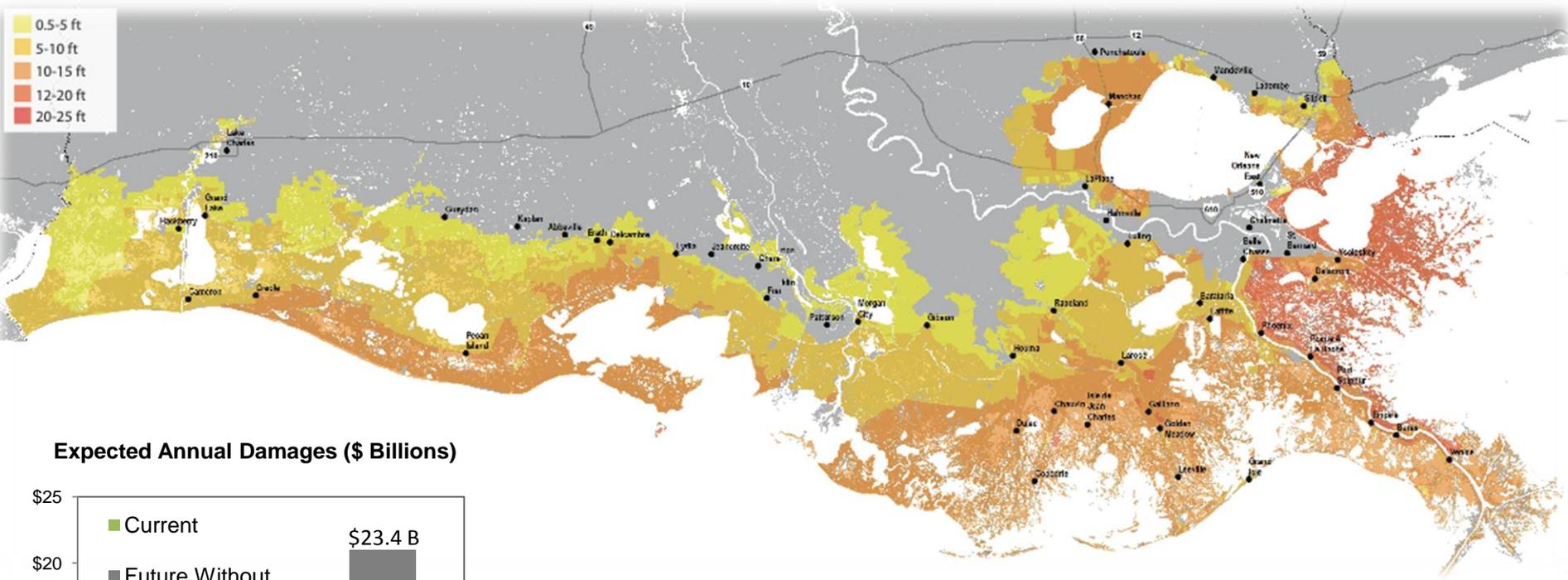
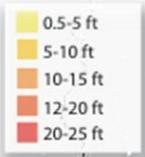
# We Know....

2060

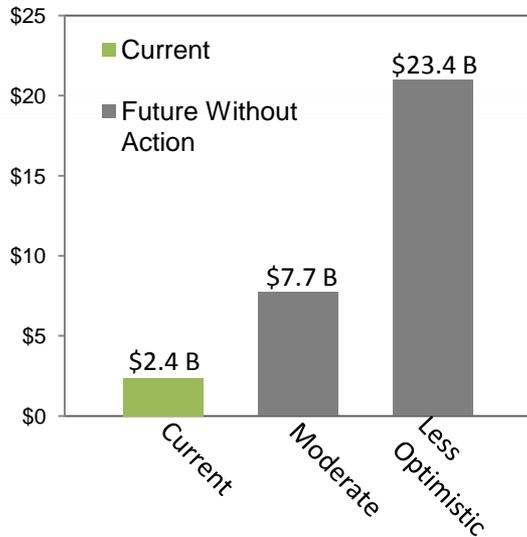


**We Could Lose Up to  
1,750 Square Miles of Land**

# We Know....



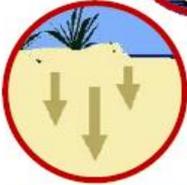
Expected Annual Damages (\$ Billions)



## The Loss of Land Will Result in a Loss of Coastal Communities

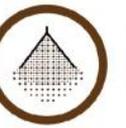
# We Know...

## There are Multiple Causes of Wetland Loss

<b>Barrier Island Degradation</b>	<b>Storms</b>	<b>Oil &amp; Gas Development</b>	<b>Canals</b>	<b>Levee System</b>	
					
					
<b>Subsidence</b>	<b>Sea Level Rise</b>	<b>Herbivory</b>	<b>Saltwater Intrusion</b>	<b>Sediment Reduction</b>	<b>Cypress Harvesting</b>

All have contributed - some have compounded the loss and others have reduced the wetlands ability to recover from damage.

## ...And Multiple Solutions

All will contribute - some are more effective and efficient solutions. Some are short-term and others are long-term solutions	<b>Structural Protection</b>	<b>Bank Stabilization</b>	<b>Oyster Barrier Reef</b>	<b>Ridge Restoration</b>	<b>Shoreline Protection</b>	<b>Barrier Island Restoration</b>	<b>Marsh Creation</b>	<b>Sediment Diversion</b>	<b>Hydrologic Restoration</b>
									
									

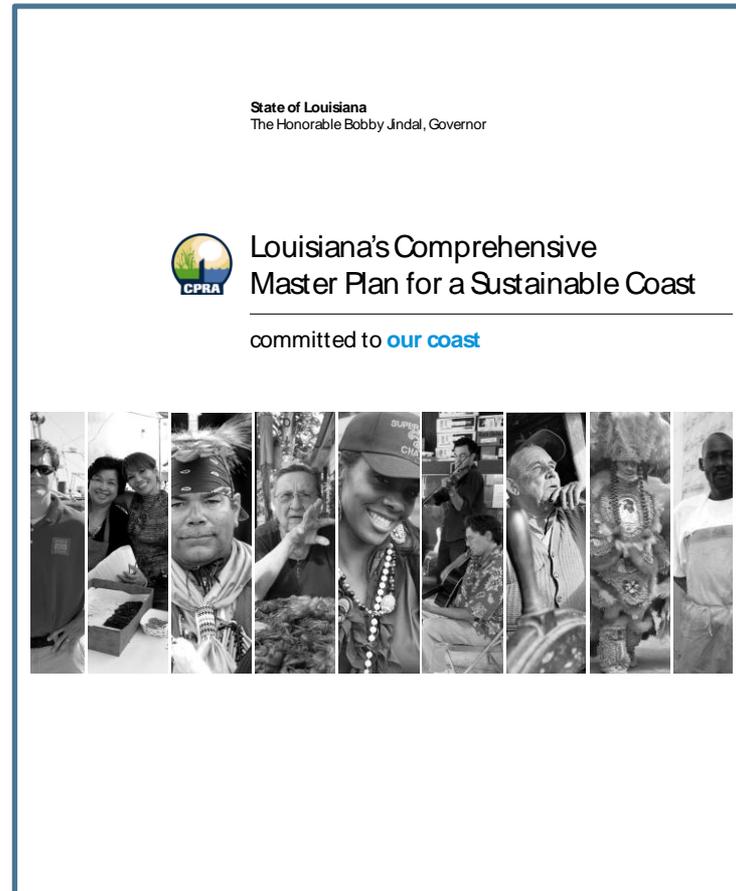
# Economic Impact of Energy, Ports and Maritime and Louisiana Seafood and Outdoor Recreation

<b>Economic Sector or Industry</b>	<b>Total Economic Impact (billions)</b>	<b>Total Jobs</b>	<b>Total Wages (millions)</b>	<b>Total Tax (millions)</b>
<b>Energy<sup>1</sup></b>	\$77.3	310,000	\$16,100	\$2,500
<b>Ports and Maritime</b>	\$33	270,000	\$5,700	\$470
<b>Seafood</b>	\$2.4	21,000		
<b>Seafood, Fishing, Boating and Wildlife Viewing<sup>2</sup></b>	\$5.7	63,000		\$378
<b>State Totals</b>	\$213.6 <sup>3</sup>	1,834,000	\$76,900	\$6,962

1. Oil and Gas Extraction, Pipeline, and Refinery Operations. 2. Select Industries from the 2008 Southwick Study. 3. Gross State Product 2010

# 2012 Coastal Master Plan

- Built on world class science and engineering
- Evaluated hundreds of existing project concepts
- Incorporated extensive public input and review
- Resource constrained
  - **Funding**, water, sediment
- Identified investments that will pay off, not just for us, but for our children and grandchildren



# Meet the Objectives of the Master Plan

## *Five Key Objectives*



### **Flood Protection**

Reduce economic losses from storm-based flooding



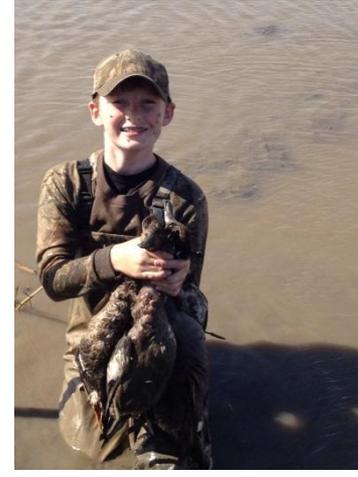
### **Natural Processes**

Promote a sustainable ecosystem by harnessing the processes of the natural system



### **Coastal Habitats**

Provide habitats suitable to support an array of commercial and recreational activities coast wide



### **Cultural Heritage**

Sustain Louisiana's unique heritage and culture



### **Working Coast**

Support regionally and nationally important businesses and industries

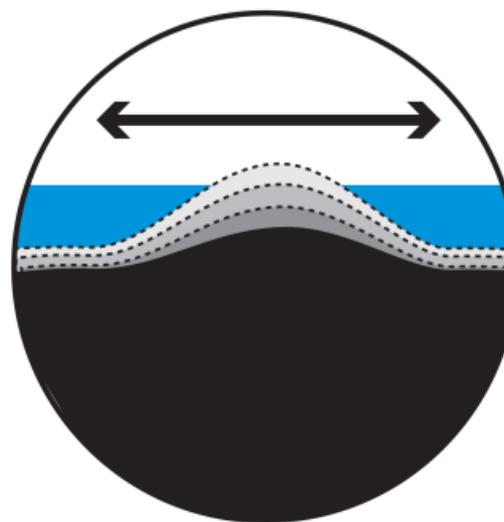
# Formulating the Master Plan: Decision Drivers

## Risk Reduction



Expected Annual  
Damages

## Restoration



Land Area

Planning Tool selects combinations of projects to maximize land building and storm surge risk reduction.

# Formulating the Master Plan: Other Key Factors

The Planning Tool evaluates how each group of projects effects key uses and resources across the coast

The Planning Tool can select projects based on preferences for these other key factors

## Decision Criteria and Ecosystem Services



Distribution of flood risk across socioeconomic groups



Flood protection of historic properties



Flood protection of strategic assets



Operation and maintenance costs



Sustainability



Support for navigation



Use of natural processes



Support for cultural heritage



Support for oil & gas



Oyster



Shrimp



Freshwater Availability



Alligator



Waterfowl



Saltwater Fisheries



Freshwater Fisheries



Carbon Sequestration



Nitrogen Removal



Agriculture/Aquaculture



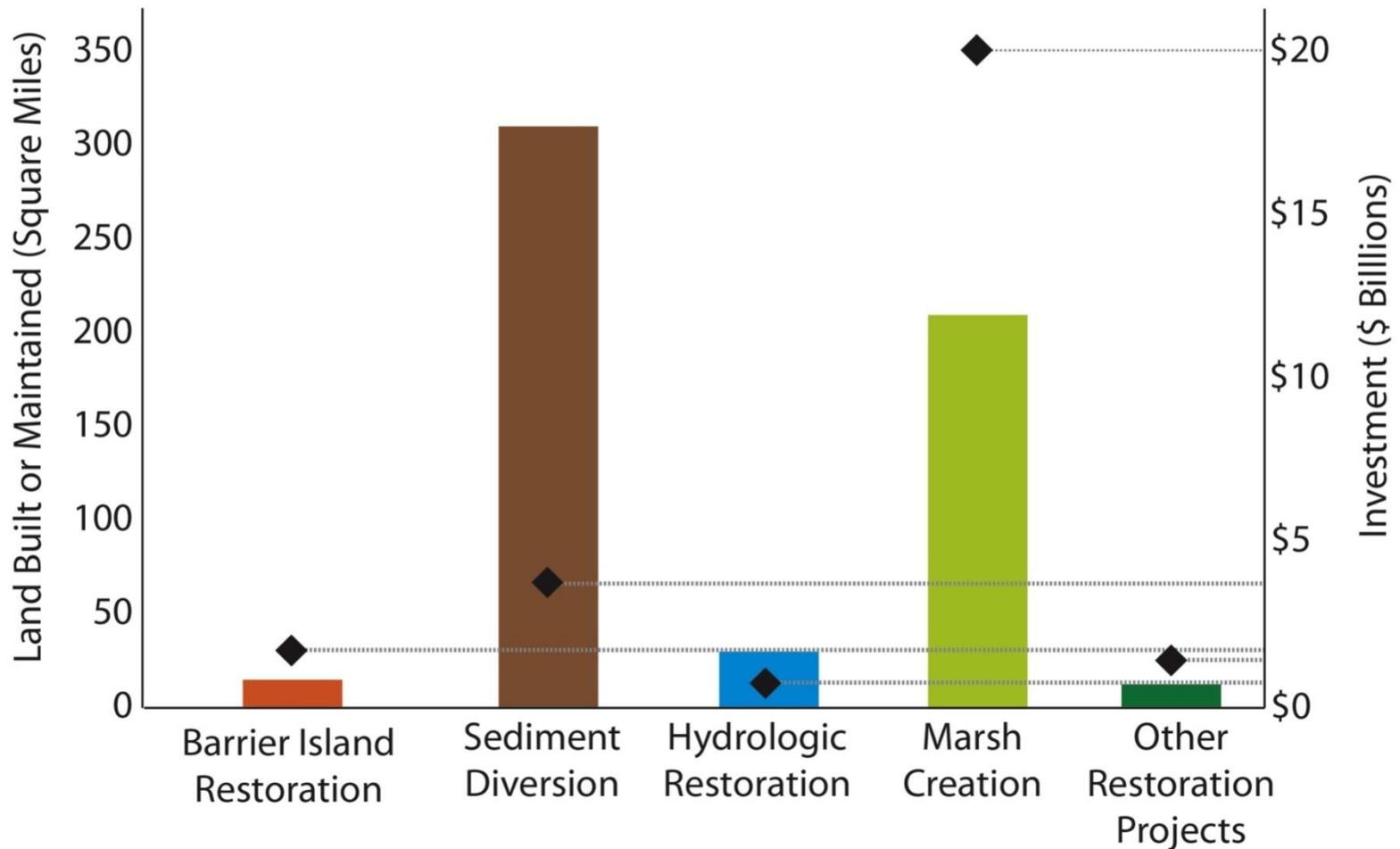
Other Coastal Wildlife



Nature-Based Tourism

# Investing in Land Building

## Long Term Land Building and Investment by Project Type

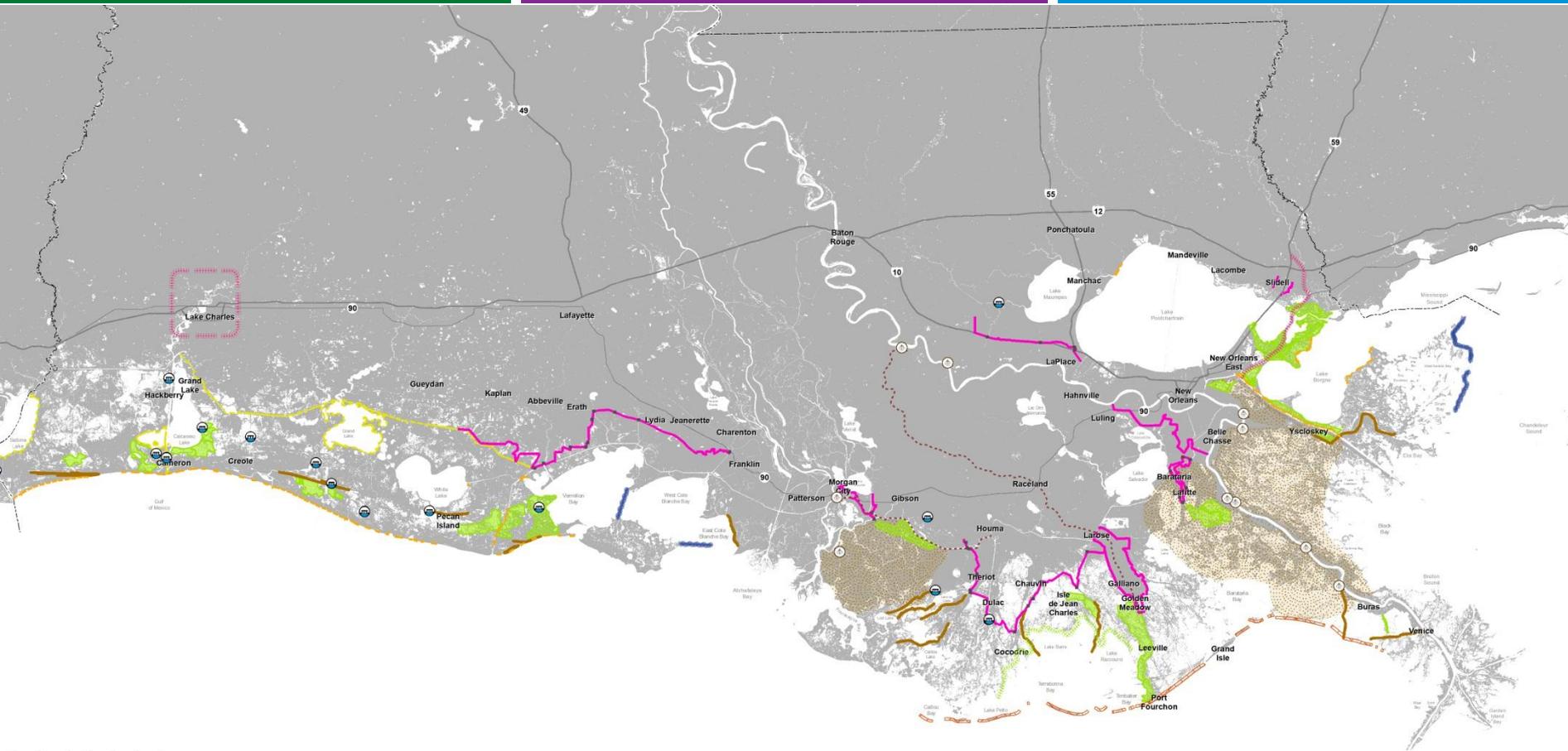


# Louisiana's 2012 Coastal Master Plan

Southwest Coast

Central Coast

Southeast Coast



**Projects Included:**

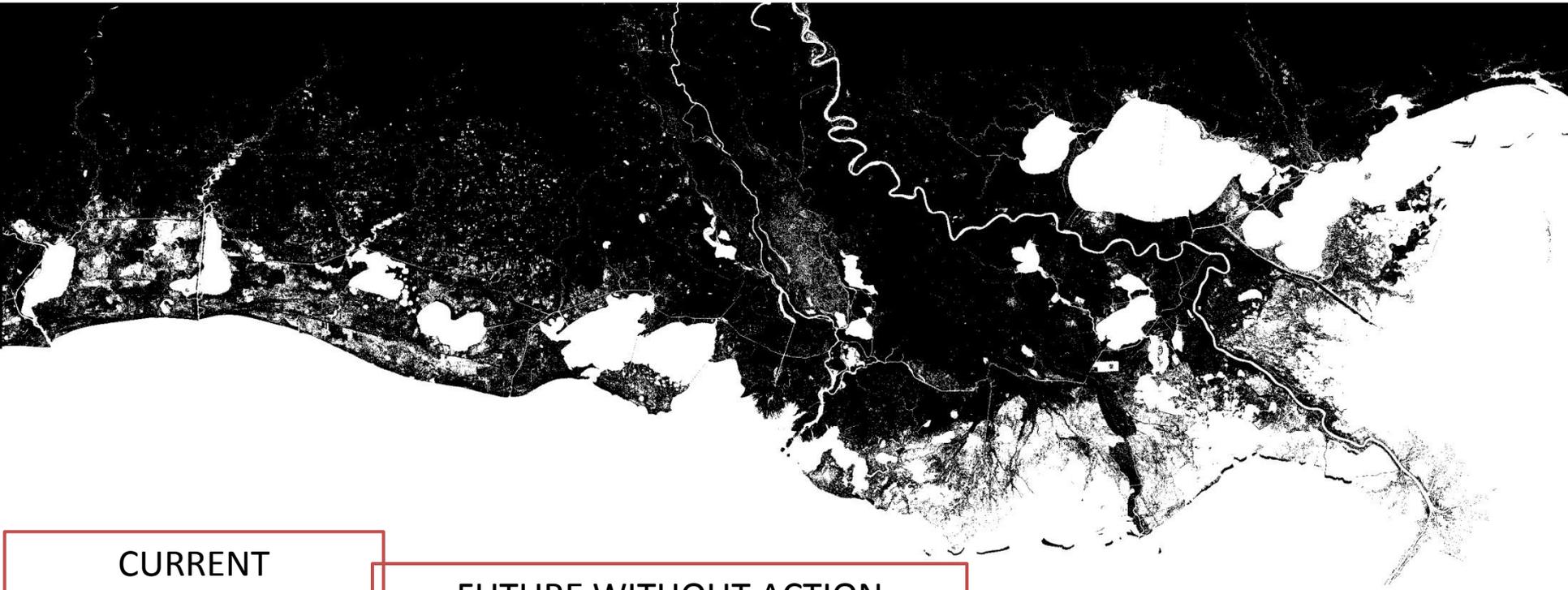
Structural Protection	Bank Stabilization	Oyster Barrier Reef	Ridge Restoration	Shoreline Protection	Barrier Island Restoration	Marsh Creation	Sediment Diversion	Hydrologic Restoration

**Projects for Further Planning:**

- Lake Pontchartrain Barrier
- Lake Charles Protection
- Terrebonne Bay Rim Marsh Creation
- Channel Realignment (Not Shown)

# We Know...

# We Need To Use All Available Restoration Tools to Sustain Our Coast



CURRENT

FUTURE WITHOUT ACTION  
YEAR 50

FUTURE WITH MASTER PLAN  
YEAR 50

# Connecting to the Rivers

**We Know...**

**The  
Mississippi  
River  
Builds  
Land**

We Know

# The Mississippi River Builds Land

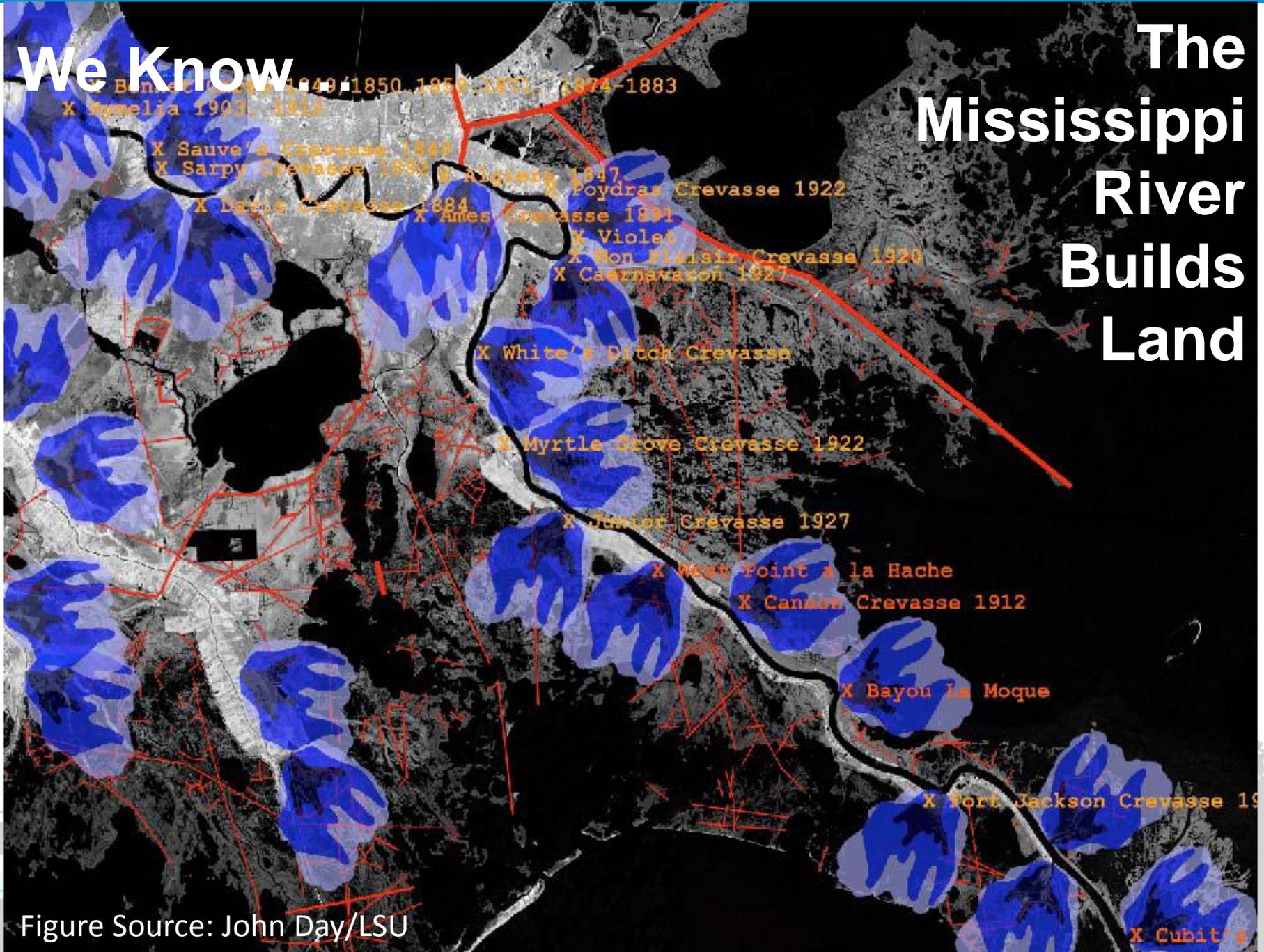
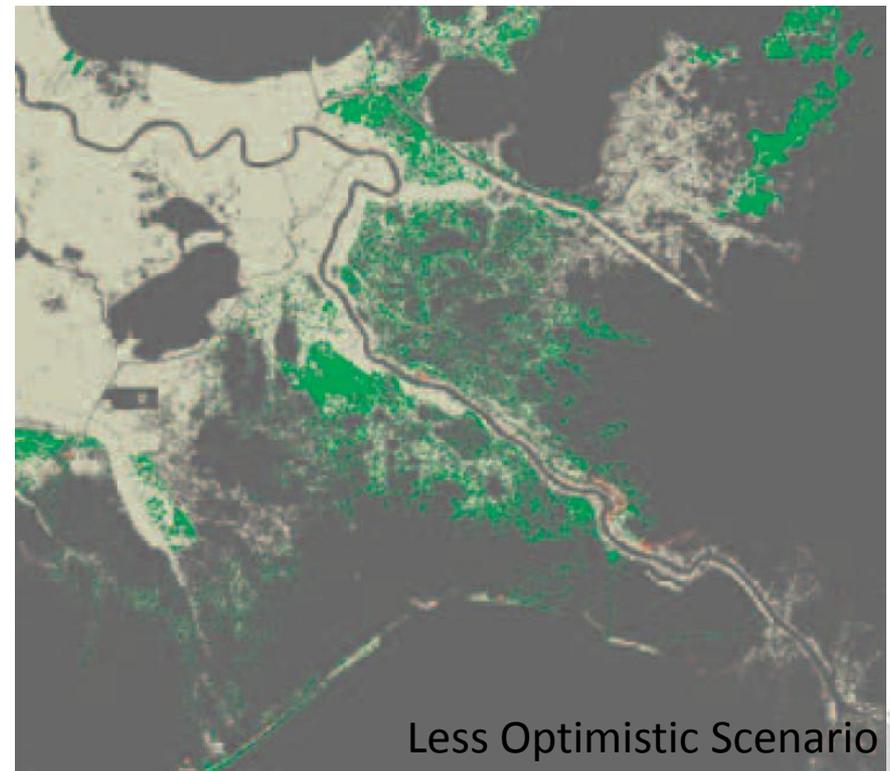
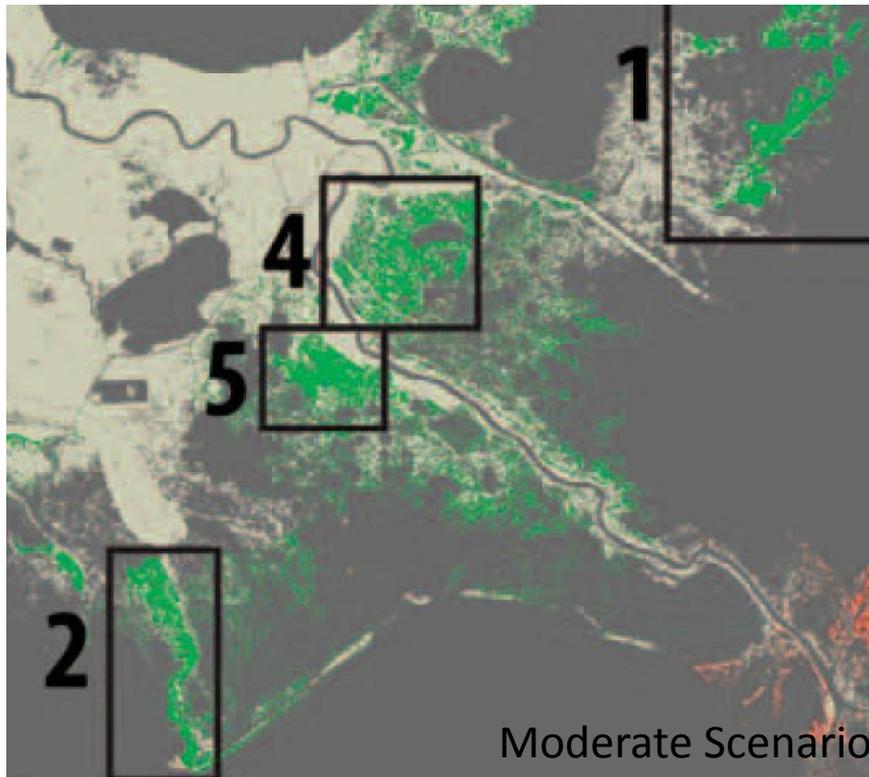


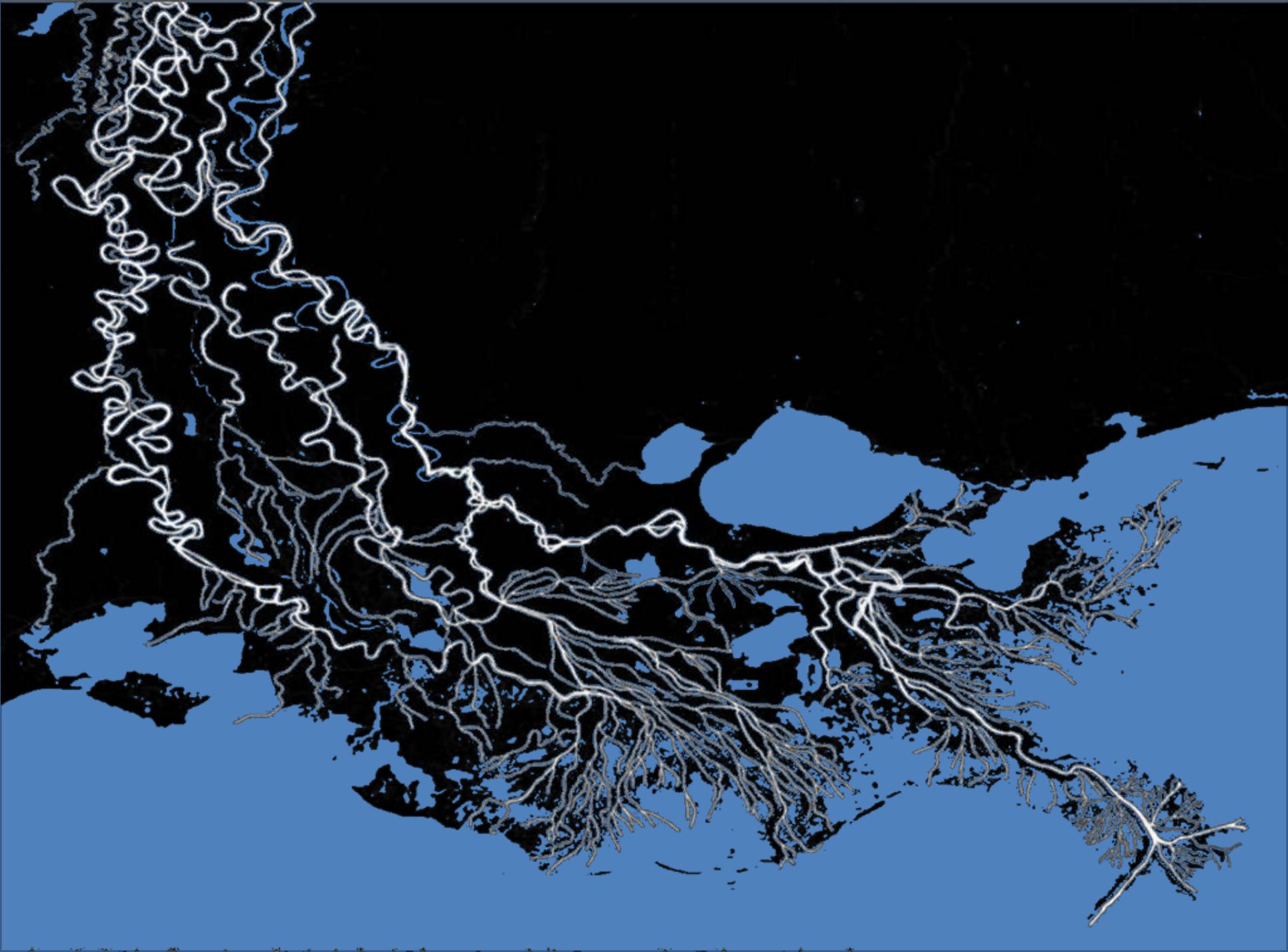
Figure Source: John Day/LSU

# We Know...

# Diversions Can Build and Maintain Land



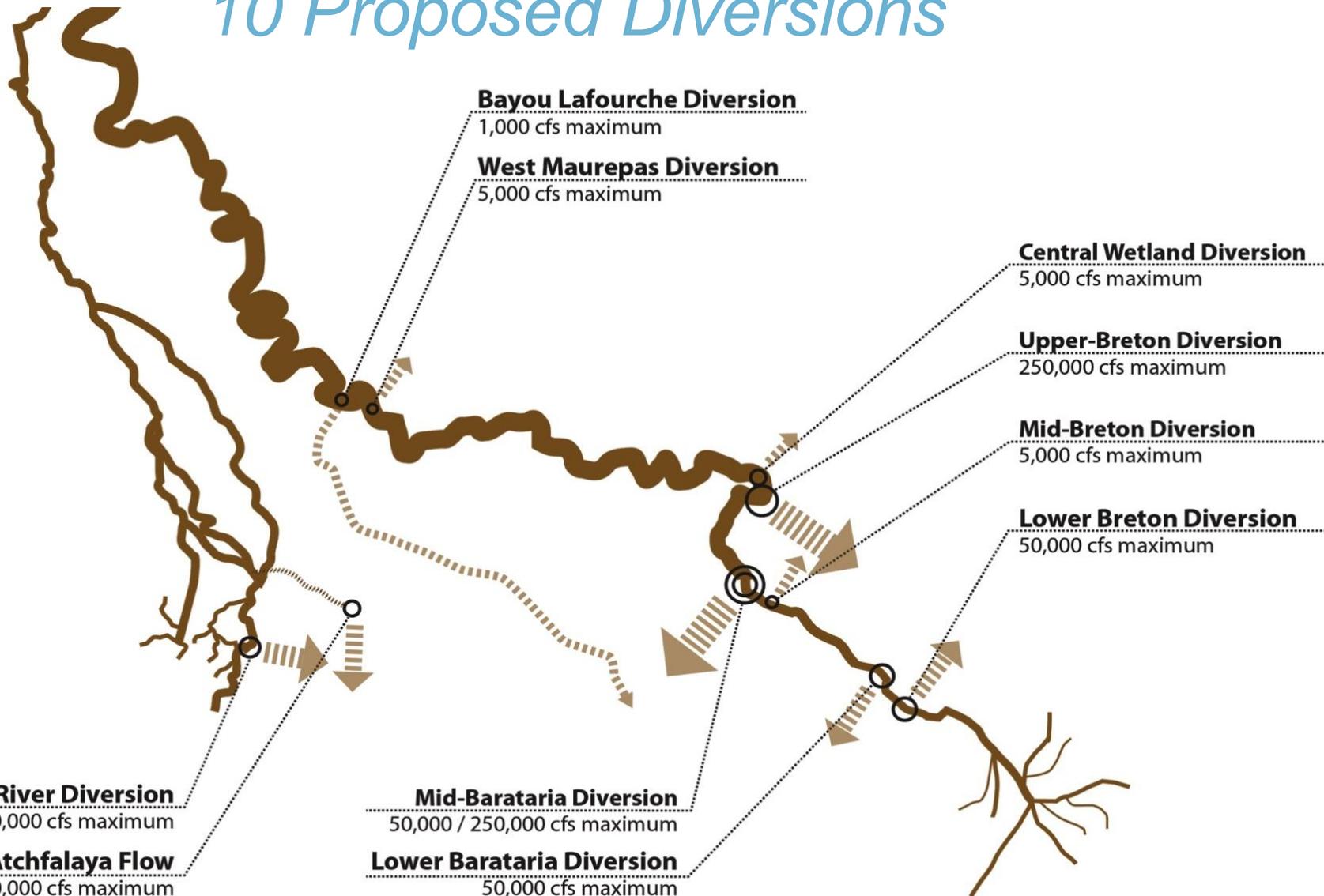
We also know that sediment diversions can increase the sustainability of marsh creation projects by supporting increased accretion and delivering nutrients to stimulate vegetation growth.





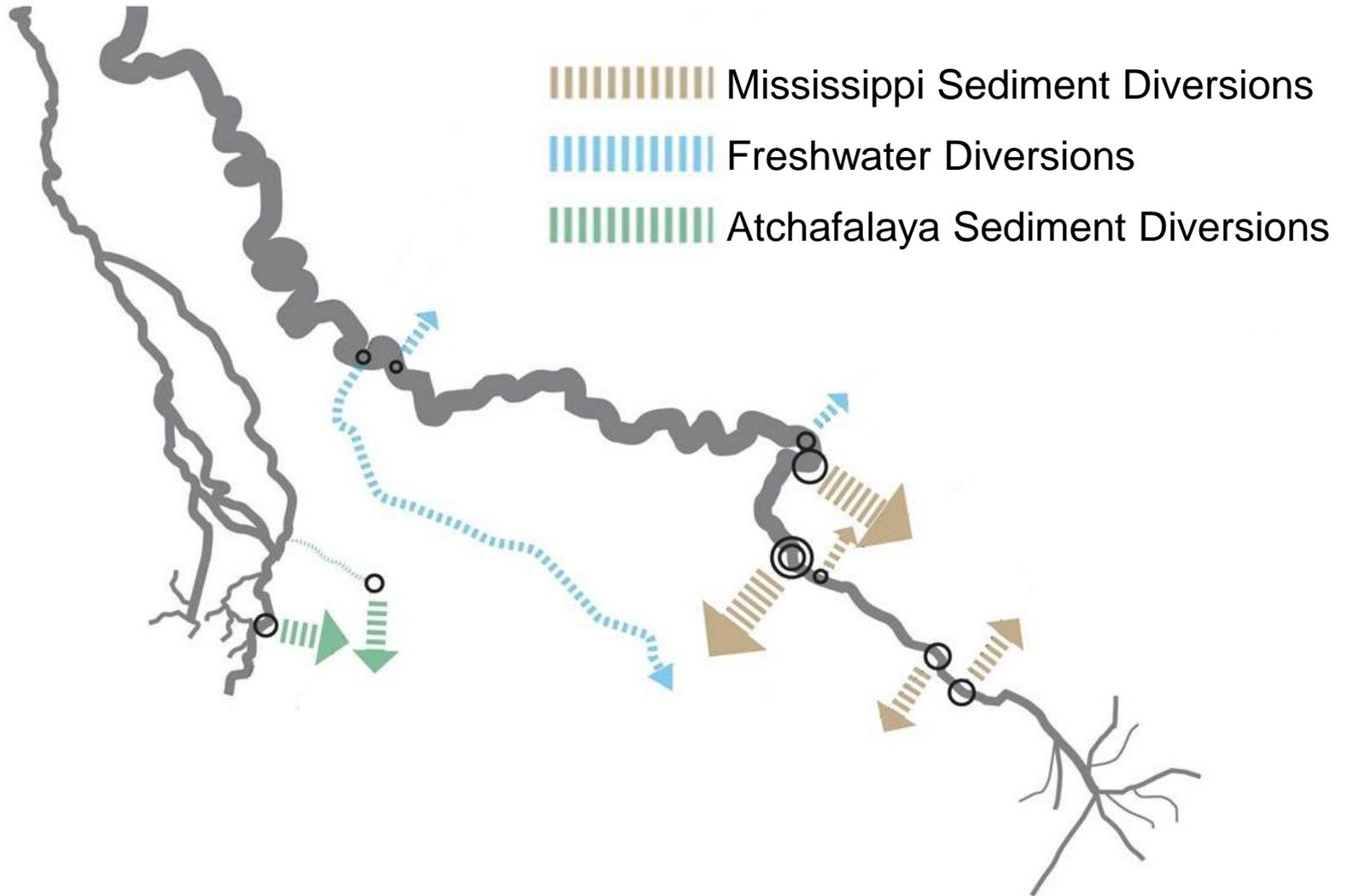
# 2012 Coastal Master Plan

## 10 Proposed Diversions



# 2012 Coastal Master Plan

## *Freshwater and Sediment Diversions*

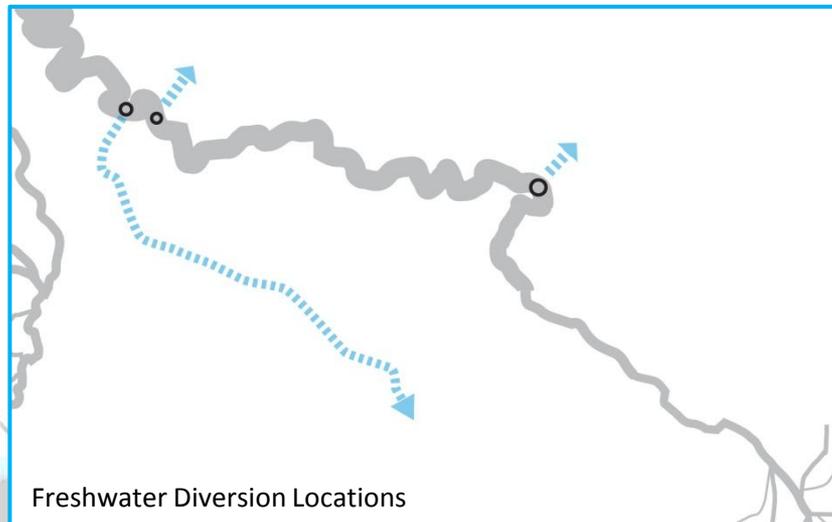


# Implementing Diversions in the Master Plan

## *Freshwater Diversions*

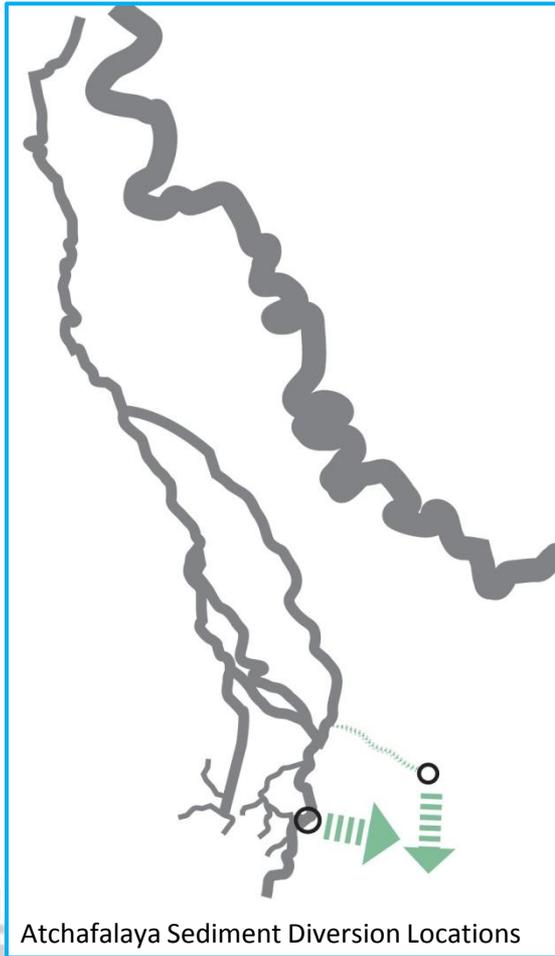
Diversion	Size	Status
Bayou Lafourche Diversion	Up to 1,000 cfs	Construction/Operations (Phase I and II funded at \$40 million through CIAP)
Central Wetlands Diversion	Up to 5,000 cfs	Project Planning (currently no active tasks)
West Maurepas Diversion(s)* <ul style="list-style-type: none"><li>• Maurepas/Hope Canal Diversion</li><li>• Convent/Blind River Diversion</li></ul>	Up to 5,000 cfs Up to 2,000 cfs Up to 3,000 cfs	-- Maurepas Diversion: Engineering & Design Convent/Blind River Diversion: Project Planning

\*The West Maurepas Diversion may consist of two ongoing diversion projects, Maurepas/Hope Canal Diversion (up to 2,000 cfs) and Convent/Blind River Diversion (up to 3,000 cfs) for a total discharge of up to 5,000 cfs.



# Implementing Diversions in the Master Plan

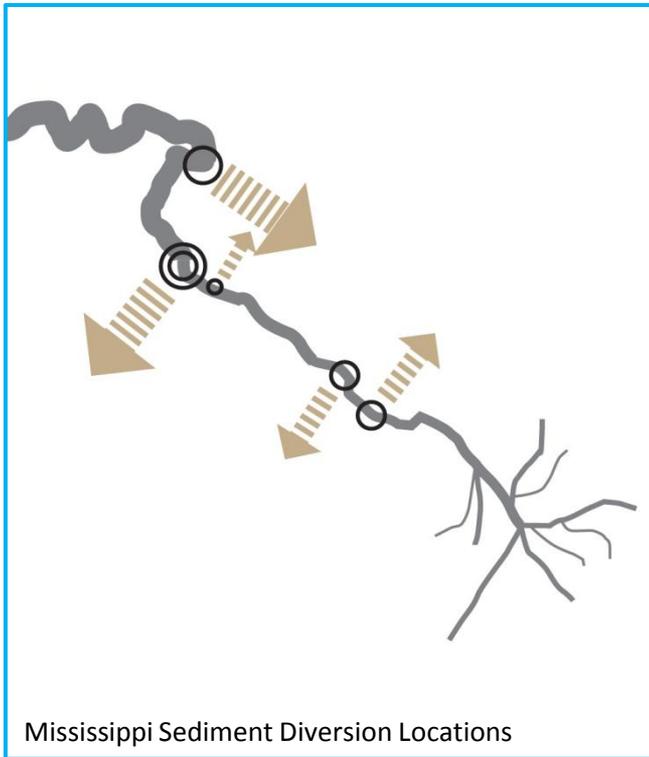
## *Atchafalaya Sediment Diversions*



Diversion	Size	Status
Increase Atchafalaya Flow to Terrebonne	Up to 20,000 cfs	Project Planning
Atchafalaya River Diversion	Up to 150,000 cfs	Project Planning (Not yet initiated)

# Implementing Diversions in the Master Plan

## *Mississippi Sediment Diversions*



Diversion	Size	Status
Mid-Barataria Sediment Diversion*	Up to 75,000 cfs	Engineering and Design (E&D)
Mid-Breton Sediment Diversion*	Up to 35,000 cfs	Project Planning
Lower Barataria Sediment Diversion	Up to 50,000 cfs	Project Planning
Lower Breton Sediment Diversion	Up to 50,000 cfs	Project Planning
Upper Breton Sediment Diversion	Up to 250,000 cfs	Project Planning

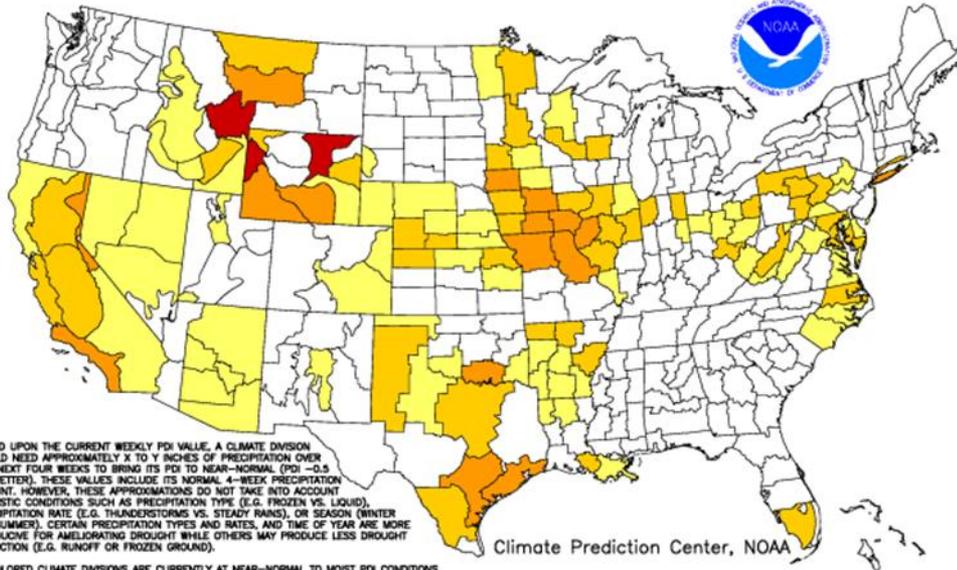
\*Diversion capacities have been refined through the LCA projects Myrtle Grove and White's Ditch:

- Mid-Barataria Sediment Diversion capacity has increased from 50,000 cfs in the 2012 Coastal Master Plan to 75,000 cfs to increase sediment capture ratios at the project site.
- Mid-Breton Sediment Diversion capacity has been modified from a 5,000 cfs diversion which operated nearly year-round, to a 35,000 cfs diversion which is pulsed during peak flood events.

# *Allocation of Resources*

# Palmer Drought Index for Louisiana

Additional Precip. Needed (In.) to Bring PDI to  $-0.5$   
Weekly Value for Period Ending OCT 5, 2013  
Long Term Palmer Drought Severity Index (PDI)



BASED UPON THE CURRENT WEEKLY PDI VALUE, A CLIMATE DIVISION WOULD NEED APPROXIMATELY X TO Y INCHES OF PRECIPITATION OVER THE NEXT FOUR WEEKS TO BRING ITS PDI TO NEAR-NORMAL (PDI  $-0.5$  OR WETTER). THESE VALUES INCLUDE ITS NORMAL 4-WEEK PRECIPITATION AMOUNT. HOWEVER, THESE APPROXIMATIONS DO NOT TAKE INTO ACCOUNT REALISTIC CONDITIONS SUCH AS PRECIPITATION TYPE (E.G. FROZEN VS. LIQUID), PRECIPITATION RATE (E.G. THUNDERSTORMS VS. STEADY RAINS), OR SEASON (WINTER VS. SUMMER). CERTAIN PRECIPITATION TYPES AND RATES, AND TIME OF YEAR ARE MORE CONDUCTIVE FOR AMELIORATING DROUGHT WHILE OTHERS MAY PRODUCE LESS DROUGHT REDUCTION (E.G. RUNOFF OR FROZEN GROUND).

UNCOLORED CLIMATE DIVISIONS ARE CURRENTLY AT NEAR-NORMAL TO MOIST PDI CONDITIONS.  
(EXAMPLE - IF 4-WEEK NORMAL PRECIPITATION IS 3 INCHES AND PDI DEFICIT TO BRING TO  $-0.5$  IS 4 INCHES, THE VALUE IS 7)

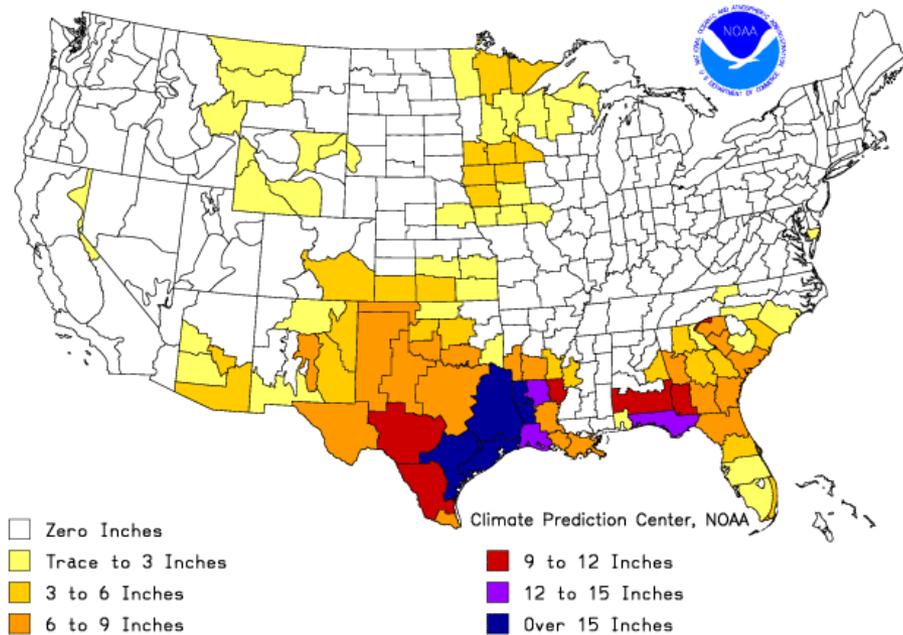


- Currently looks good, but we know things are likely to change.
- 2013 = only small deficits in a few state areas



# Palmer Drought Index for Louisiana

Additional Precip. Needed (In.) to Bring PDI to  $-0.5$   
Weekly Value for Period Ending NOV 26, 2011  
Long Term Palmer Drought Severity Index (PDI)



- 2011 = major drought issues state wide



# FRESH WATER FOR THE MERMENEAU BASIN

Primarily due to the 2011 drought the LA Senate enacted SCR 40 which resulted in:

## REPORT TO THE 2013 LOUISIANA LEGISLATURE



May 1, 2013



# Water Use in Southwest Louisiana

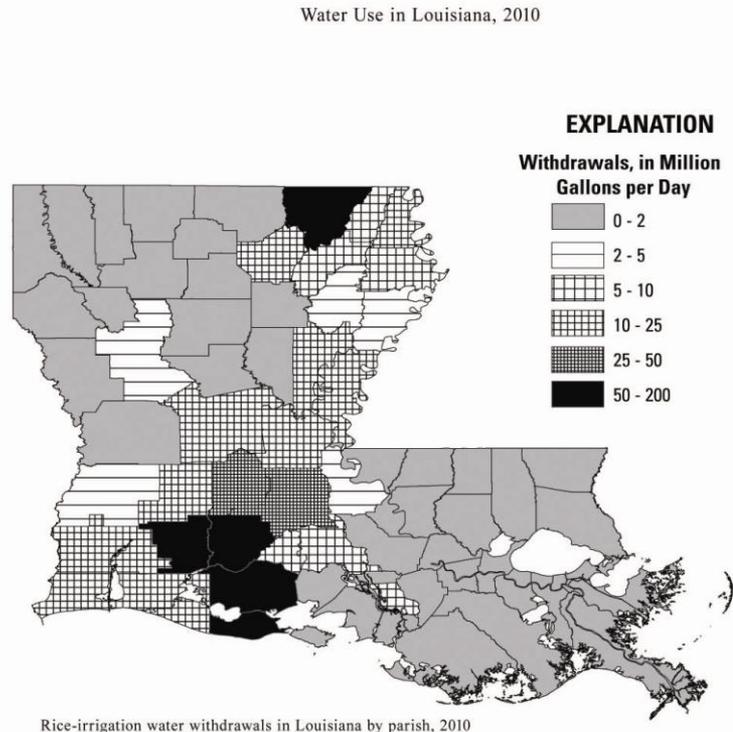
- Primary users of surface water are power generation, rice irrigation, industry, and aquaculture.
- Primary users of ground water are rice irrigation, aquaculture, and public.

2007 LDOTD Report



# Water Use in Southwest Louisiana

Figure 3



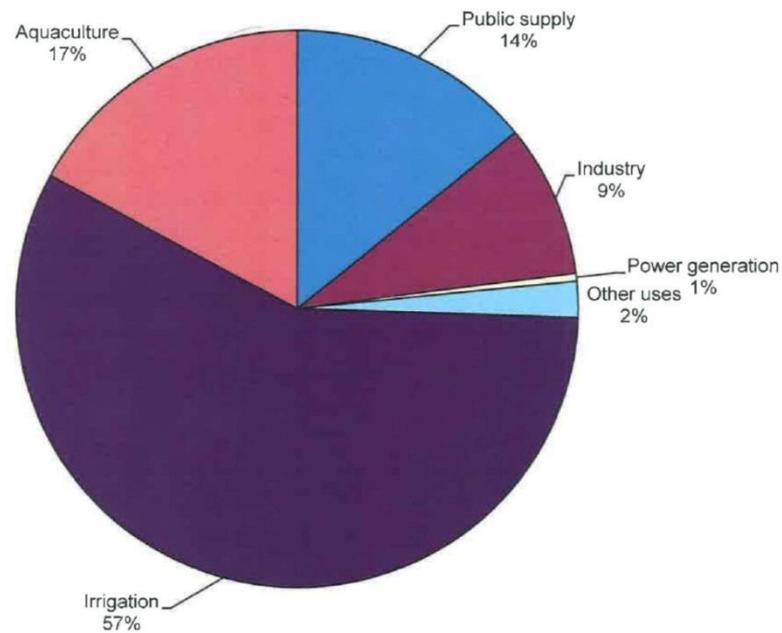
Source: Louisiana Department of Transportation and Development, 2011

- Mermentau Basin is the dominate water withdrawal area of the State
- Acadia Parish has a withdrawal rate exceeding 180 million gallons per day, the highest in the State
- A lack of surface water delivery systems increase farmers' usage of groundwater.

# Water Use in Southwest Louisiana

Figure 4

## WITHDRAWALS FROM THE CHICOT AQUIFER SYSTEM, 2005 (660 MILLION GALLONS PER DAY)



Source: U.S. Geological Survey, 2010

# Water Use in Southwest Louisiana

- The report concluded that the Atchafalaya River is the primary resource able to supply reliable and sufficient amounts of water to benefit the Mermentau Basin.
- And, an Atchafalaya River diversion to the west is consistent and supported by the 2012 Master Plan.



# Water Use in Southwest Louisiana

Specific recommendations/actions to respond to the fresh water needs of the region:

1. First, Louisiana should pursue a Comprehensive Water Resources Plan.
2. Acting In harmony with #1, the State, with direction from the legislature, could conduct a detailed feasibility and design effort for a major freshwater diversion into the Mermentau Basin.
3. Entities within the Mermentau Basin should focus regionally and pursue some type of multi-parish organization (perhaps patterned after the Teche-Vermilion Fresh Water District) to promote water supply efforts and ameliorate future drought impacts.



# 2012 Master Plan

- The 2012 Master Plan seeks long term sustainability through goals like preventing and limiting saltwater intrusion, building river diversions, and restoring wetlands.
- The plan relies on having enough fresh water and sediment to help rebuild the coast, combat salinity, and enhance habitats.
- Wise use of all our surface water resources is crucial to the plan.



# Addressing Key Considerations

## *Tools and Models*

### **System-Wide/Master Plan:**

- Planning Level Models (Eco-hydrology, Wetland Morphology, Vegetation, ADCIRC with UNSWAN, CLARA damage model, Ecosystem Services)
- System-Wide Assessment and Monitoring Program (SWAMP)
- Adaptive Management Framework
- Systems Operations
- Coastal Community Resilience Program Development

### **Mississippi River Hydrodynamics Study, in partnership with the USACE:**

- 1D Hydrodynamic Model (HEC-6T)
- Multi-Dimensional Models (ADH-SedLib, Delft 3D, FVCOM and Flow3D)
- Small-Scale Physical Model

### **Project-Specific Analysis:**

- Planning Level Models
- Ecosystem/Fish and Wildlife Species Modeling (Habitat Suitability Index, Ecosystem/Food Web Modeling)
- Multi-Dimensional Models (Delft 3D and Flow3D)
- Social Impact Assessment, including economics (methodology under development)

### **On-Going Research Projects**

# Formulating the Master Plan: Other Key Factors

The Planning Tool evaluates how each group of projects effects key uses and resources across the coast

The Planning Tool can select projects based on preferences for these other key factors

## Decision Criteria and Ecosystem Services



Distribution of flood risk across socioeconomic groups



Flood protection of historic properties



Flood protection of strategic assets



Operation and maintenance costs



Sustainability



Support for navigation



Use of natural processes



Support for cultural heritage



Support for oil & gas



Oyster



Shrimp



Freshwater Availability



Alligator



Waterfowl



Saltwater Fisheries



Freshwater Fisheries



Carbon Sequestration



Nitrogen Removal



Agriculture/Aquaculture



Other Coastal Wildlife



Nature-Based Tourism

# COMMITTED TO OUR COAST



# Policies and Programs

- **Transition Assistance:**
  - Master plan acknowledges that large scale restoration projects may create small and large dislocations of resources.
- **The state is also committed to the following:**
  - Developing a planning framework to help communities, businesses and individuals adapt to anticipated changes in the landscape.
  - Working with affected communities and stakeholders to design projects that consider ways to minimize unavoidable impacts while still meeting project and master plan objectives.
  - Identifying public and private tools that may assist communities, businesses and individuals in the transition process.
  - Assessing possible impacts and consulting with those affected, as the projects identified in the master plan move through project planning and design phases.